Citation:

Vergnaud AC, Péneau S, Chat-Yung S, Kesse E, Czernichow S, Galan P, Hercberg S, Bertrais S. Dairy consumption and 6-y changes in body weight and waist circumference in middle-aged French adults. *Am J Clin Nutr.* 2008 Nov;88(5):1248-55.

PubMed ID: 18996859

Study Design:

Prospective Cohort Study

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

The purpose of this study was to investigate the relationship between dairy composition and calcium intake with 6 year changes in body weight and and waist circumference (WC).

Inclusion Criteria:

- Subjects who had completed at least six 24-h dietary records during the first 18 mo of follow-up and who had available anthropometric measurements at the first (1995–1996) and last (2001–2002) clinical examinations of the SU.VI.MAX were included.
- Subjects had to sign an informed-consent form and a completed screening questionnaire
- Lack of any disease likely to hinder active participation or to threaten 5-y survival
- Acceptance of the possibility of being given a placebo and acceptance of the constraints of participation of the SU.VI.MAX
- Lack of previous regular supplementation with any of the vitamins or minerals in the supplement provided
- Absence of extreme beliefs or behavior regarding diet

Exclusion Criteria:

Persons who had a major health event during the follow-up and those with any missing values for covariates.

Description of Study Protocol:

Recruitment

13,017 subjects (5141 men 45–60 y old, 7876 women 35–60 y old) from all over France were recruited in 1994 and 1995 by a large national media campaign via television, radio,and newspapers to participate in the Supplementation en Vitamines et Mineraux Antioxidants (SU.VI.MAX) Study, a randomized, double-blind, placebo-controlled primary-prevention trial initially designed to evaluate the effect of daily antioxidant supplementation at nutritional doses (120 mg vitamin C, 30 mg alpha-tocopherol, 6 mg-Beta carotene, 100 mcg selenium, and 20 mg zinc) on the 8-y incidence of cancer and ischemic heart disease.

Design: Prospective cohort study

- Subjects were invited regularly to a medical visit involving either biochemical sampling (in 1994–1995,1996–1997, 1998–1999, and 2001–2002) or clinical examination, including anthropometric measurements (in 1995–1996,1997–1998, and 2001–2002).
- Subjects were also encouraged to provide dietary data in the form of 24-h dietary records every 2 mo after enrollment in 1994 and 1995.

Blinding used (if applicable): not mentioned

Intervention (if applicable): not applicable

Statistical Analysis

- Quartiles of dairy food consumption and calcium intake were calculated by sex for the distributions of both consumers and nonconsumers.
- The sex and sex overweight status yogurt consumption interactions were significant (P = 0.02 and 0.04, respectively), which indicated that the associations between weight change and the consumption of these dairy products differed according to both sex and initial weight status.
- Therefore, analyses were performed separately for normal-weight and overweight men and for normal-weight and overweight women.
- Associations of changes in body weight and WC over the 6-y follow-up with consumption of dairy products and dietary calcium intake were assessed by using analysis of covariance with adjustment for age.
- In the multivariate model, the data was further adjusted for other potential confounders at baseline, including energy, alcohol,mean adequacy ration index (an indicator of nutritional quality), intervention group, educational level, smoking status, physical activity level, baseline outcome value, and menopausal status (for women).
- For each type of dairy product (i.e., milk, cheese, or yogurt), the consumption of the other 2 dairy foods was controlled for.
- Accordingly, dairy and nondairy calcium intakes were adjusted for each other.
- Tests for linear trend were performed.

Data Collection Summary:

Timing of Measurements

- Diet at baseline was completed during the first 18 months of follow-up.
- At least 6 24-h dietary records during the first 18 months of follow-up were utilized.
- Anthropometric measurements were taken at the the first (1995–1996) and last (2001–2002) clinical examinations.

Dependent Variables

- Weight, height, and waist circumference were measured by using standardized procedures.
- Body mass index (BMI) ; in kg/m^2, a BMI > 25 was defined as overweight

Independent Variables

- Total dairy products were considered, as were 3 specific dairy products—milk, cheese, and yogurt (including cottage cheese, small individual containers of cream cheese, and regular yogurt)—and expressed in servings per day.
- The nutritional values of the diet, including calcium, were estimated by using a French computerized food composition

table developed for the SU.VI.MAX Study. In addition,calcium intakes from dairy and nondairy products were studied separately.

Control Variables

- Energy
- Alcohol
- Mean adequacy ration index (an indicator of nutritional quality)
- Intervention group
- Educational level
- Smoking status
- Physical activity level
- Baseline outcome value
- Menopausal status (for women).
- For each type of dairy product (i.e., milk, cheese, or yogurt), the consumption of the other 2 dairy foods was controlled for.

Description of Actual Data Sample:

Initial N: 2267 subjects

Attrition (final N): 2267 subjects (1022 women, 1245 men)

Age: Mean age ± SD women 50.8 ± 4.3, men 51.5 ± 4.4*4 (P <0.0001)*

Ethnicity: unknown

Other relevant demographics:

Anthropometrics: men had significantly higher BMI, weight, waist circumference than women. Men had significantly higher total calcium, dairy and nondairy calcium intakes than the women

Location: France

Summary of Results:

Key Findings

- The associations between dairy products and anthropometric changes differed according to sex and overweight status at baseline.
- In overweight men only, 6-year changes in weight and waist circumference were inversely associated with the consumption of dairy products, especially that of milk (P = 0.02 for both weight and waist circumference changes) and yogurt (P = 0.01 and 0.03 for weight and waist circumference changes, respectively).
- No relation was observed with cheese and calcium intake.
- Positive relations were found between milk consumption and waist circumference change in overweight women and between yogurt consumption and weight change in normal-weight women.
- Multivariate analyses showed a trend toward increases in weight with high dairy calcium intakes in normal-weight women.

Other Findings

- In multivariate analyses, negative (borderline significant) associations between changes in both weight and WC over the 6-y period and total dairy product consumption were found only in men who were overweight at baseline (P for trend = 0.06 and 0.09, respectively).
- When dairy products were analyzed by categories, the inverse relations in overweight men were strengthened for milk (P for trend= 0.02 for both weight and WC changes) and yogurt consumption (P for trend = 0.01 and 0.03 for weight and WC changes, respectively) and disappeared for cheese consumption.
- Associations with 6-y changes in body weight and WC in normal weight women except a positive association between yogurt consumption and weight change (P for trend = 0.04)

Author Conclusion:

The relation of dairy products and calcium intake with changes in weight and WC may differ according to sex, initial body weight status, and type of dairy products. The negative association between dairy products and anthropometric changes observed in overweight men was not explained by dairy calcium intakes, which suggests that other components of dairy products or specific dietary patterns associated with dairy consumption may help to explain the observed associations.

Reviewer Comments:

Subjects were part of a large study evaluating the relationship between vitamin and mineral supplementation and cancer and heart disease; may therefore have had a healthier lifestyle than the general population.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	Yes
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	Yes

Validity Questions

1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes

1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	**Were study groups comparable?**	N/A
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	N/A
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	N/A
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	Yes

4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	Yes
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	Yes
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes

7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes